FREEPORT-McMoRan
COPPER & GOLD

Chino Mines Company
Box 10
Bayard, NM 88023

March 6, 2012

Via Certified Mail #70111570000231144319
Return Receipt Requested

Mr. James Davis, PhD, Director
New Mexico Environment Department
Resource Protection Division
P. O. Box 5469
Santa Fe, New Mexico 87502

Dear Dr. Davis:

Re: Draft Human Health Risk Assessment Work Plan
Lampbright Investigation Unit (LIU) - Chino AOC

Freeport-McMoRan Chino Mines Company (Chino) appreciates the opportunity to submit comments, under separate cover, on the *draft Human Health Risk Assessment Work Plan* for the Lampbright Investigation Unit under the Chino Administrative Order on Consent (AOC). Chino received the draft LIU work plan from the New Mexico Environment Department (NMED) on January 19, 2012. The comment letter was submitted today to Mr. Phil Harrigan of the NMED.

Please contact Mr. Ned Hall at (520) 393-2292 if you have any questions regarding Chino's comments on the draft work plan.

Sincerely,

Timothy E. Eastep, Manager
Environment, Land & Water

TEE:pp
20120305-003

xc: Phil Harrigan, NMED
Joseph Fox, NMED
Mark Purcell, EPA
Petra Sanchez, EPA
Ned Hall, Freeport-McMoRan Copper & Gold (via email)

675855

Freeport-McMoRan Chino Mines Company – Administrative Order on Consent
Comments on the New Mexico Environment Department Human Health Risk Assessment Work Plan for the Lampbright Investigation Unit (LIU)

This document presents Freeport-McMoRan Chino Mines Company's (Chino's) comments on the New Mexico Environment Department (NMED) Human Health Risk Assessment (HHRA) work plan for the Lampbright Investigation Unit (LIU) received January 19, 2012. The HHRA work plan was prepared by NMED's contractor, Neptune and Company, Inc. (Neptune), in accordance with the Scope of Work associated with the Administrative Order on Consent (AOC) between Chino and the NMED dated December 23, 1994. Chino's comments are as follows:

General Comments:

1. During the history of the Action Order on Consent (AOC) in addressing the 4 individual Investigative Units (IUs), three work plans and resulting HHRAs have been finalized as required under the CERCLA process, with each IU risk assessment helping to inform the next IU work plan. The LIU HHRA work plan should be more consistent with previous HHRA work plans completed for the other IUs. In particular, the Smelter Tailing Soils IU (STSIU) work plan, due to similar geography, is the most comparable to the LIU, whereas the Hanover Whitewater Creek IU (HWCIU) HHRA is a more in-depth study due to residential proximity. Chino requests that the LIU HHRA work plan explain deviations from earlier AOC-vetted work plans in order for stakeholders and the public to understand the differences. Some specific issues with regard to deviation from precedent include:

    a. In the Executive Summary and throughout the document, Neptune indicates that a Tier 1 screen will be conducted using maximum concentrations compared to screening levels with all potential exposure pathways, but this is inconsistent with how the STSIU and Hurley Soils IU (HSIU) HHRAs were completed. For the STSIU and HSIU, maximum detected concentrations were compared to EPA Regional Screening Levels (RSLs) in order to select constituents of potential concern (COPCs). Neptune, as indicated in the work plan, intends to include the garden and meat ingestion pathways in a "multipathway model" for the Tier 1 screen to select COPCs. If that is the case, however, it is noted that the September 16, 2010 STSIU pre-Feasibility Study Remedial Action Criteria letter indicated that NMED "did not select any criteria based upon the foodstuff pathways due to the high uncertainty in those pathways. This decision is further supported by the fact that the reference area exceeded risk criteria in the foodstuff pathway calculations." Based upon this conclusion for STSIU and the fact that STSIU and HSIU did not have this type of screen, the risk assessment for LIU should not conduct a "multipathway" Tier 1 screening but should instead compare maximum detected concentrations to EPA RSLs. This was also an issue for the HWCIU Phase I analysis (Neptune, 2001) and it impeded the progress on that IU by five years due to the level of review and comment required to come to

agreement on the exposure parameters and uptake factors used to finalize the screening criteria.

b. Data inputs to be used in the HHRA are not clearly stated. The algorithms, exposure parameters, and uptake factors for the Tier 1 screening analysis and the Tier II risk assessment need to be fully disclosed in the work plan. These parameters are presented at this stage in the process to allow stakeholders to review and provide comment before the risk assessment is completed. In addition as stated earlier in a more general context, departures from exposure parameters presented in previous IU HHRA work plans should be provided to assist the reader with review in this context.

c. The term COI (constituent of interest) should be replaced by constituent of potential concern (COPC).

2. The conceptual site model (Figure 1) needs further discussion. Specifically, the following are technical comments on Figure 1:

   a. Potential downgradient soil or biota impacts from operational-related releases are being comprehensively addressed (including protection of human health) under the Sitewide Abatement and DP-376 Corrective Action, and are thus not the subject of the AOC investigation. Primary sources related to operational releases include the Lampbright Stockpile Operations (LSO) SX/EW Plant and Pregnant Leach Solution (PLS) collection system. Primary release mechanisms include seepage of meteoric water, raffinate spray or PLS to groundwater, overland surface flow of PLS (i.e., from LSO to the PLS collection system), or storm water originating from source areas, and spills associated with operations at Lampbright. Thus, the sources and transport mechanisms associated with the "pipeline distribution system," (which should also be defined in the work plan) as shown in Figure 1, should not be assessed under the AOC HHRA. The work plan should distinguish which of the sources, transport mechanisms and exposure media will be specifically addressed in the AOC HHRA, similar to Figure 3-3 in the LIU RI Proposal.

   b. While it simplifies the figure to distill the receptor scenarios into an alphabetic label "A, B, C" etc., it is not transparent for the public or other stakeholders; explanations as to the abbreviated receptor scenarios should be provided in the figure or else the alphabetic labels should be replaced by more transparent descriptions of the scenarios.

   c. The inclusion of a residential scenario is not appropriate for the LIU. The study site within the IU lacks utilities and has rugged terrain such that access from public roads is not possible. It is highly unlikely that residents will occupy these areas due to the closure activities, steep terrain, and slopes prohibitive of stable access for residential home construction – especially the upland areas adjacent to the stockpiles. Expansion of the heap stockpile, overlap with closure, access and

property ownership, and the terrain of the LIU are relevant to consideration of reasonably foreseeable land use.

The inclusion of ingestion of homegrown produce, eggs, poultry and beef by receptors are not relevant exposure pathways for this IU. These exposure pathways are incomplete under current exposure conditions and it is highly unlikely that these exposure pathways would be complete any time in the foreseeable future. Although the STSIU and HWCIU HHRAs included these exposure pathways, these scenarios were not ultimately considered in the STSIU pre-FS RAC due to the high uncertainty associated with those pathways, and the HWCIU HHRA was finalized by breaking out non-agricultural residents from agricultural residents. Moreover, for STSIU, the reference area exceeded risk criteria in the foodstuff pathway calculations. Replication of this scenario for the HHRA at LIU will likely result in the same associated uncertainties and erroneous risk calculations for reference areas, especially if NMED's intent is to use STSIU reference area soils again in the assessment of human health risks for LIU.

Further, the LIU soils are typical of New Mexico area soils in that they have a poor organic matter content and highly sandy texture (ARCADIS JSA, 2001), and thus are not likely to be suitable to harvest homegrown produce (Dickerson, 2001). A productive garden in LIU would need to be supplemented with peat or other carbon enriched soil sources on a regular basis to produce a viable and consistent source of produce. Plant root exposure to LIU soils, bioavailability, transport and uptake of metals would all be substantially modified in this scenario compared to what appears to be an assumed total exposure of produce to current soil concentrations in the LIU.

The poorly defined and highly conservative assumptions used in the produce and "meat" ingestion exposure pathways have been shown in the past to result in an overestimation of risk. In Hurley, NMED identified arsenic as a potential risk driver in produce in the HSIU HHRA; however, when actual samples were collected from Hurley resident gardens along with produce samples from nearby markets, arsenic was much lower than the concentrations predicted by the model (Golder, 1998). Similarly, at Questa Mine near Taos, New Mexico, EPA predicted higher metal concentrations in produce than was determined when samples of homegrown produce were analyzed for metals (USEPA, 2005).

d. The CSM identifies complete exposure pathway for surface water ingestion under ranching, trespassing, or recreational scenarios. Surface water drainages in the LIU are generally ephemeral streams with flow occurring only during and immediately after major precipitation events or during the period of spring runoff from snow melt at higher elevations. The sporadic presence of persistent surface water pools would not be expected to generate a substantial or reliable source of water for garden produce. Thus, it is highly unlikely that there would be a significant, if at all complete, exposure pathway between an ephemeral surface water source and ingestion by a receptor. This is consistent with the HWCIU HHRA, which identified incidental ingestion of surface water and ingestion of

groundwater as potentially incomplete exposure pathways (Table 3-1 in Neptune, 2008). Additionally, the steep terrain and flooding risk within the drainages of the LIU would substantially limit access by chickens and as such is not a likely complete exposure pathway.

In spite of these comments, if NMED decides to pursue pathways for an agricultural resident, please include an analysis for non-agricultural resident as well as agricultural resident in order to distinguish between the two categories of risk, as was done in the HWCIU HHRA.

e. Based on recent discussions with Neptune, Chino uses the following comment to capture a pending change to the draft work plan. NMED has determined that the beef ingestion pathway for the rancher scenario would not be appropriate for LIU. There currently exists one operator who works the pasture on a seasonal basis by himself. It is not expected that the rancher would cull or otherwise take some of his stock for eating. The operation is a commercial cow calf operation whereby calves are sold annually. Only in specific and rare situations, for instance in the circumstance of a broken leg, would the rancher butcher a cow for eating.

3. Section 3.2 addresses the use of background concentrations. This section states that "COI" risks will be addressed for LIU site area, reference area, and STSIU reference area soils. The STSIU reference area soils will be assessed because it "may represent less-mineralized areas of the LIU." However, the STSIU reference area soils represent different soil types altogether than the LIU soils (see http://websoilsurvey.nrcs.usda.gov/app/HomePage.htm; printouts of the areas of interest are attached showing NRCS soil classifications), implying different geological formations associated with the STSIU area, and thus may not potentially represent either mineralized or unmineralized formations anywhere in the LIU.

   Soil types from reference and site areas should be similar, if not the same, to make the most appropriate comparisons between reference and site conditions. This has been the approach taken in HSIU HHRA, for example, which identified reference locations having similar soil types, as well as similar parent material (e.g., Gradient 2000).

   Moreover, there have been technical issues raised with the STSIU reference dating to 1999. The Phase II Ecological RI Report (ARCADIS JSA, 2001) presents a summary of Upland Reference in Section 4.3.1. On page 4-11 of that report, the text states:

   > "Soils from the Phase II ERI Upland Reference consist mostly of loams; however, based on observations during the Phase I ERI, soil types from upland ERA locations include outcrops and associations not found in the reference areas. The dominant soil types identified during the Phase I ERI included Santana-rock outcrop complex, Encierro-rock outcrop complex, Muzzler-rock outcrop association, Paymaster-Ellicott, Sanloren-Majada, Plack-gravelly loam, Lonti-gravelly clay loam, and Manzano Loam. Therefore, the soil types found in the Ecological IU reference areas may not be representative of the wide range of conditions found in the Upland Investigation Area."

Given that this was a major issue for STSIU, it does not seem practical or technically accurate to bring this dataset into the LIU. Neptune should reconsider their technical approach in this regard.

As described in the LIU RI (ARCADIS, 2012), the mineralized nature of the surface geology is recognized to occur throughout LIU. Specific formation outcrops and structural geologic features were mapped largely in the vicinity of the reference area, and have been shown to contain mineralized materials and associated elevated metal concentrations, including arsenic and copper. Certain formations may be associated with higher frequency of mineralization, but that is not necessarily reflected by the metal concentrations in collected samples. As demonstrated in the LIU RI Report, three reference area samples were collected from the Beartooth Quartzite formation, 3 samples were collected from the Colorado formation, and two samples were collected from quartz diorite sills cutting through the Colorado formation. All three formations are thought to reflect areas containing mineralized materials. Metal concentrations were roughly within the same order of magnitude among formations, with slightly higher concentrations of some metals sometimes seen in the Beartooth and Colorado formations, and lower concentrations in the Early/Late Sill formations. Yet statistical analysis indicates the reference area can be regarded as a single population. For arsenic, for example, the mean concentration of reference area samples was 4.17 mg/kg with standard deviation of 2.02 and the 95% upper tolerance limit (UTL) was 9.38 mg/kg, based on a normal distribution. There were no outliers at the 1% level indicating that the 8 samples are from one statistical population.

Variability in metal concentrations apart from apparent mineralized content is reflected in other reports concerning LIU, for example, as shown in Golder (2010b; referenced in the LIU RI Report), metal concentrations were sporadically elevated in samples collected from test pits, often with non-detect values for "mineralized" samples and higher metal concentrations for formations thought to be largely unmineralized.

Although intensive geologic mapping has to this point been focused largely within the LIU reference area, faulting has been mapped throughout the LIU, and field notes taken at the time of sample collection of downwind (site) samples continue to show the presence of outcrops and structural formations associated with mineralized materials. For example, as described in the LIU RI Report, geologic mapping and sampling of exposed jasperoid outcrops were performed in the vicinity of L-20 in November 2011. This mapping is consistent with site reconnaissance and sampling activities for the LIU RI in 2010, in which massive silica replacement veins in the limestone formations identified as jasperoids were observed in the area of L-20.

Thus, variability in soil metal concentrations is expected in LIU soils, reflecting the variable underlying geology and presence of mineralized materials in both the reference area and site area soil samples. Separating the data into sub-populations based on assumed content of mineralized materials will not necessarily reduce variability in soil metal concentrations; however, such a separation will increase the level of uncertainty in the LIU HHRA.

Further, the LIU reference area dataset is representative and appropriate to use for background comparisons in the LIU HHRA. As stated above, STSIU reference area concentrations are not reflective of unmineralized (or mineralized) soils at LIU because the soil types are all together different at STSIU than LIU, and thus will have different metal concentrations due to differences in natural mineralogy. Geologic data was provided in the LIU RI Report to demonstrate that the metal concentrations in the reference area reflect natural variability of geological formations, many of which are associated with a high frequency of mineralized materials, and that the variability in both geologic formations and soil metal concentrations continues to be reflected in the site area soils. All analytical data was obtained in accordance with the QA/QC provisions and using the laboratory QC samples specified in the QAP.

Lastly, clarification as to how the background soils will be used in the HHRA should be clearly stated. On the one hand, the second to last sentence of this section describes how the HHRA will estimate risks for the LIU and STSIU data, but the sentence previous to that states, "[...] Neptune has chosen not to conduct *a priori* comparisons between site-related COI concentrations and LIU reference area concentrations for the purpose of screening mining-related COIs." What will be the purpose of evaluating risks to background data?

Section-Specific Comments:

1. Executive Summary, first sentence: please delete reference to the consulting and professional services agreement between Neptune and Chino. This information has not been disclosed in earlier work plans and it is not helpful for the public or stakeholders because it is confusing. Neptune is NMED's consultant and that is the key piece of information for the public to know. The contracting mechanism by which NMED gets its technical needs met is not relevant to this work plan.

2. Executive Summary, fourth paragraph, please delete the second sentence, "Remedial Action Criteria (RAC) development is not specifically addressed in this Work Plan, as such development will only occur in a dispute resolution scenario, and will be addressed via separate tasks negotiated between Neptune, NMED, and Chino." Pre-feasibility study (FS) RAC are issued by NMED and dispute resolution is not an imminent situation but only arises under certain circumstances.

3. Section 1.1, first paragraph, first sentence. Please delete "Environmental investigation at the overall Chino site is governed by the complex regulatory milieu." This is not a practical topic sentence for the paragraph. Delete the last sentence of the paragraph, "Therefore, the AOC is the most relevant and direct regulatory structure for the HHRA." In the third sentence of the paragraph, delete the words "in general" as the RI process is dictated or required by the AOC and it is not the RI process *in general.*

4. Section 1.2, paragraph 2: The Tier 1 screen should be used to select Constituents of Potential Concern (COPC) to be consistent with past risk assessments. The Tier 1 screen should show a comparison of maximum detected concentration to EPA Regional

Screening Level (RSL) to be consistent with Section 2.3 in the STSIU HHRA work plan (Gradient, 2005, page 3).

5. Please list the "metals" that will be assessed in the HHRA, as stated in Section 2.2.2, first sentence.

6. Section 2.2.4, paragraph 3, sentence 3, states that "The groundwater data are relevant, however, for the LIU HHRA as sediment data have been collected under the DP. Transport mechanisms include potential interfaces of groundwater and surface water plus sediments." It is unclear what is meant here because groundwater, and surface expressions of groundwater (i.e., seeps), are being comprehensively addressed under the Sitewide Abatement and DP-376. Please clarify.

7. Please identify "any other relevant data", as stated in Section 2.2.5, first sentence.

8. Section 2.3.1, paragraph beginning with *"These assumptions are collectively termed 'scenarios'[...]"* states "Therefore, the LIU HHRA will only evaluate the most likely scenarios, based upon current use and observation of land use in surrounding areas." As stated in the general comment above, the Chino mine is unlike adjacent areas in that it lacks roads and utilities and has rugged terrain. It is highly unlikely that residents will occupy these areas due to the closure activities, steep terrain, and slopes prohibitive of stable access for residential home construction – especially the upland areas adjacent to the stockpiles. In contrast, current residential properties at off-site locations are clustered around major roads and are established in relatively flat terrain. Expansion of the heap stockpile, overlap with closure, access and property ownership, and the terrain of the LIU are relevant to consideration of reasonably foreseeable land use. Thus, evaluation of the potential for a residential scenario only through observations of adjacent land uses does not address the unique landscape and conditions of the LIU.

9. Section 2.3.1, second paragraph, fourth sentence: please delete "For example, demand for the mine's product may go down in the future, and thus, the work force may be reduced; but the area may become more desirable for retirees". This sentence does not make sense in the context of the paragraph and the technical issues with this statement are so numerous that it is easier to delete it than provide comment on how to rewrite it.

10. Section 2.3.1, fourth paragraph, second sentence, states, "The intent of the RME concept is to ensure that it is likely that exposure and risks will be overestimated." Please modify this sentence. USEPA (1992) guidance says that "The RME, which is defined as the highest exposure that could reasonably be expected to occur for a given exposure pathway at the site, is intended to account for both uncertainty in the contaminant concentration and variability in the exposure parameters [...]." It is important, where possible, to cite directly to EPA or NMED guidance on these matters.

11. Section 2.3.1, fifth paragraph, sixth sentence states, "Additionally, the degree of conservatism associated with deterministic RME exposure model results may be unknown, so comparisons between an "average" estimate and a RME estimate do not

provide an accurate estimate of the degree of bias associated with the RME estimate." Please modify this sentence to state, in the following context:

> "Risk Descriptors are intended to address variability of risk within the population and the overall adverse impact on the population. In particular, differences between high end and central tendency estimates reflect variability in the population, but not the scientific uncertainty inherent in the risk estimates. There will be uncertainty in all estimates of risk. These uncertainties can include measurement uncertainties, modeling uncertainties, and assumptions to fill data gaps. Risk assessors should address the impact of each of these factors on the confidence in the risk values. (USEPA, 1995)"

12. The next paragraph in this same section begins, "Therefore, for the purpose of this HHRA, an alternative method is proposed..." Please reword as follows for clarity:

> "Therefore, for the purpose of this HHRA, uncertainty in the RME estimate will be further characterized by probabilistic analysis". Also, further in the paragraph, a citation to Cullen and Frey, 1999 is used; however, the reference given is a general text book on probabilistic methods. It is more appropriate and accurate in this context to cite the EPA Risk Assessment Guidance for Superfund, Volume III, Part A, Process for Conducting Probabalistic Risk Assessment (USEPA, 2001)."

13. Section 2.3.2, Please insert text into the first paragraph similar to Section 3.4 in the STSIU HHRA work plan which states:

    For exposure and potential risks to occur, a complete exposure pathway must exist. A complete exposure pathway requires the following elements (USEPA, 1989)

    - A source and mechanism for release of COCs
    - A transport or retention medium,
    - A point of human contact (exposure point) with the affected medium, and
    - An exposure route at the exposure point.

    This text is basic EPA sanctioned language and is useful to clarify the conceptual site model for all stakeholders. Consider moving Section 2.1 with the citation to Figure 1 to Section 2.3.2 where it falls more naturally into context for the reader.

14. Section 2.3.2, third sentence in the paragraph beginning with, *"It is possible that some receptors might drink surface water..."* states the following: "The RI (Arcadis, 2011) found that there were no exceedences of drinking water criteria at the site; however, this does not exclude the possibility that risks may be present." Please delete "however, this does not exclude the possibility that risks may be present" because it does not make sense in the context of the sentence and does not provide helpful information for the

stakeholders who will be reviewing the work plan. This is a topic for the uncertainty section of the HHRA because there is always an inherent assumption that risks could be present but the risk assessment is supposed to characterize the nature of the risks to the most practical extent possible and then highlight uncertainties in the uncertainty section.

The CSM suggests that "other risks" potentially include consumption of homegrown produce which has accumulated COIs (COPCs per above) from surface water or consumption of surface water by chickens and livestock which are then consumed by humans. However, as stated in the general comment above, it is highly unlikely that there would be a complete pathway between an ephemeral surface water source and homegrown produce. Additionally, the steep terrain and flooding risk within the drainages of the LIU would substantially limit access by chickens and as such is not a likely complete exposure pathway. As such, clarification of the statement in Section 2.3.2 is requested to identify what specific other potential risks are thought to be a result of COIs (COPCs) in surface water.

15. Section 2.3.2, second paragraph, third sentence, "Based upon interviews with Chino staff, there appears to be little current recreational use, probably because the area is fenced and use beyond the approved ranching...". Please delete the word "probably" in this sentence. There is no current recreational use because the land is privately owned and secured from recreators. There is an exposure scenario for trespasser.

16. Section 2.3.2, Table 1: Please delete the word "acreage" under residences in Column 1 or expound upon its meaning in a footnote or text addition.

17. Section 2.3.2, last paragraph on page 9 states, "Note that children are only evaluated in the residential scenario, but this may change depending upon the level of detail necessary." This is a work plan and it should include which exposure scenarios are to be evaluated or not. A child resident is the most conservative scenario to evaluate and if the risk assessor believes that another child exposure scenario should be evaluated, it should be included herein, not proposed in some future document. Please delete the sentence or propose another child evaluation. A challenge with exposure scenarios for a child is physical access. A child will not be exposed under current conditions unless a trespasser adult brings them on to the property.

18. In Section 3, please identify the data inputs that will be used to identify COPCs. What data will be used for the Tier I analysis? What, if any, outlier analysis will be used for the Tier I or Tier II assessments?

19. Section 3.1 states,

> "The COIs present in soil at the LIU have been deposited over time, primarily by deposition of airborne dust attributable to stockpiles. Thus, given the deposition mechanism for soil COIs, a gradient of COI concentrations in soil at the LIU may exist, with concentrations decreasing with increasing distance from the stockpiles. Statistical analysis will either support or not support this hypothesis."

As demonstrated in the RI report, the variable, underlying geology also has a bearing on the soil metal concentrations, and this should be taken into account for any statistical analysis. Soil samples collected closest to the stockpile represent one geology (Colorado Formation) while samples collected further away from the stockpile represent different geologies (Beartooth Quartzite and Syrena Formations). While the underlying geology alone may not account for significantly different soil metal concentrations, statistical analyses should include geological characteristics as relevant factors in the interpretation of soil metal concentrations throughout the LIU.

20. Section 3.1 should be similar to Section 2.3 in the STSIU HHRA work plan wherein a summary is provided as to how constituents will be selected for evaluation in the risk assessment. Similar description is provided in the LIU HHRA work plan in Section 4.1, second paragraph, but would be more appropriate in Section 3.1.

21. Under Section 3.1, second paragraph, please delete the second sentence. The sentence states, "Determination of the spatial concentration distribution of detected and screened COIs is ideally determined via statistically designed grid-based sampling" and this is not an accurate statement. The determination of the type, conditions, quality and quantity of data to collect is a product of the data quality objectives (DQOs) process, which is used to develop a scientific and resource-effective data collection design (USEPA, 1994).

22. The last sentence of Section 3.1, second paragraph states, "the samples collected in the RI [...] will be re-examined to assess whether the data set is adequate [...]" This statement appears to call into question the validity of the dataset, however NMED commented on the LIU RI Proposal and the LIU RI Report providing direction on the substantiation of the dataset and its usefulness for the HHRA. Please edit this paragraph and add a sentence that indicates that NMED provided comments on the LIU RI Proposal and LIU RI Report that included comments on the usefulness of the dataset to the HHRA.

23. Section 3.1, first paragraph, first sentence: please delete the word "of" in the sentence which states, "It is important that all site-related constituents are identified, and the concentrations ~~of~~ are accurately quantified (EPA, 1994a)."

24. Section 3.2, first paragraph, second sentence: please delete the duplicate word "in" in the sentence which states, "Any mine site has highly mineralized deposits in ~~in~~ its natural state (i.e., pre-mining)."

25. Section 3.3, second paragraph: please modify the sentence "These exploratory data analyses will be used to gain an understanding of the data and to investigate attributes related to the hypotheses of interest." What hypotheses of interest? The LIU RI Report includes analysis of the data and the risk assessment is ultimately to assess usability. Section 2.4 of the STSIU HHRA work plan, for example, provides a simple and effective summary of the data usability evaluation for the HHRA.

26. Section 3.4, first paragraph, first sentence: please delete the reference to the consulting and professional services agreement between Neptune and Chino. As stated previously,

this is information has not been disclosed in earlier work plans and it is not helpful for the public or stakeholders because it is confusing. Neptune is NMED's consultant and that is the relevant piece of information.

27. Section 4.1, second paragraph: the first sentence states, "The RI conducted a form of screening analysis but the "human health decision criteria" employed by the RI do not account for all exposure pathways of interest in the HRHA." The LIU RI conducted a screening analysis that was used in the STSIU and HSIU HHRAs and also was proposed and approved by NMED in the LIU RI Proposal.

28. Section 4.2, equations: please add the word "average" to chronic daily constituent intake when "Intake" is defined, or redefine it as "average daily dose".

29. Section 4.2.2 describes the equations that will be used to estimate inhalation of dust. However, the intake equation shown is inconsistent with RAGS Part F (USEPA, 2009), which recommends that when estimating risk via inhalation, risk assessors should use the concentration of the chemical in air as the exposure metric (e.g., mg/m^3), rather than inhalation intake of a contaminant in air based on IR and BW (e.g., mg/kg-day). Chino requests that risk estimates for inhalation pathways be consistent with the most recent EPA guidance.

30. Section 4.2,3, last sentence: Please provide exposure parameters.

31. Information and references for the sources of toxicity values described in Section 4.2.2 should be updated to include the most recent information, i.e., IRIS information, referenced with "EPA, 2011b", should be updated to "USEPA, 2012", and relevant updates should be incorporated into the work plan.

32. Section 5, first paragraph, second sentence: please delete. The sentence is, "These are essentially "conversion factors" applied to intake estimates." This statement is not technically accurate or helpful to the lay reader.

33. Section 5, sixth paragraph: See Comment No. 29 regarding consistency with recent EPA guidance. If this guidance will not be followed, please provide rationale as to why the HHRA work plan is not following this EPA guidance. Please add a sentence or more to this paragraph referencing this guidance and the approach taken herein which diverges from it.

34. Section 5: Copper toxicity should be evaluated based upon the potential for nausea based on an acceptable exposure concentration, which NMED and Chino resolved during the HSIU pre-FS RAC negotiation. This analysis was carried into the STSIU HHRA.

    Specific language on copper toxicity as per page 32 of the STSIU HHRA work plan states:

    > "As part of the HHRA, we will give special consideration to those metals that are essential elements. Recommended daily intake levels (RDIs) for adults and children, as specified by the Institute of Medicine (IOM, 2001). The HHRA will

briefly discuss the most recent RDIs, including variations based on factors such as age and gender. We will also summarize the typical dietary intake rates for COCs. While these RDIs will not be factored into quantitative risk assessments, understanding the relationship between toxic levels of essential metals, intake levels required to maintain health, and typical dietary intake rates allows site exposure to be put into perspective."

This paragraph is taken from page 33 of the STSIU HHRA work plan (Gradient, 2005). Please add this language to this section of the LIU HHRA work plan.

35. Section 7, Uncertainty Assessment, fourth paragraph: citation to Cullen and Frey, 1999, should be updated with USEPA, 2001, as discussed under Comment No. 12.

36. Section 7, last paragraph: change RAC to "pre-FS RAC".

37. Section 8, last sentence: change RAC to "pre-FS RAC".

38. Appendix I, the section titled "Garden produce, livestock and game" states:

> "Actual metal concentrations across the active root zone may only be approximated with such soil data, and the native vegetation sampled may not accumulate metals in a manner similar to produce or forage plants."

What is the rationale for the assumption that the LIU will contain a different vegetation community (i.e., one that contains "forage plants") than what is there presently (i.e., the "native vegetation")?

39. Please capitalize "ARCADIS".

40. Please update the reference to the LIU RI Report to ARCADIS, 2012.

References Cited:

ARCADIS. 2012. Administrative Order on Consent, Chino Mines Company. Remedial Investigation Report, Lampbright Investigation Unit. February 24.

ARCADIS JSA. 2001. Administrative Order on Consent, Phase II Remedial Investigation Report for the Ecological IU, Chino Mines Company. Volume 1 of II. August 28.

Dickerson, G.W. 2001. Home Vegetable Gardening in New Mexico. Extension circular 457-B. Cooperative Extension Service College of Agriculture and Home Economics, New Mexico State University.

Golder. 1998. Administrative Order on Consent, Phase I Revised Remedial Investigation Report, Hurley Soils Investigation Unit, Rev. 2.0, November 10.

Gradient. 2000. Human Health Risk Assessment Hurley Soils Investigation Unit. February.

Gradient. 2005. Chino Mines Administrative Order on Consent, STSIU Human Health Risk Assessment Work Plan.

Neptune. 2001. Phase 1 Risk Analysis for Hanover/Whitewater Creek IU. Prepared on behalf of NMED for Chino Mines Company Administrative Order on Consent. May.

Neptune. 2008. Administrative Order on Consent, Chino Mines Company. Human Health Risk Assessment, Hanover and Whitewater Creek Investigation Units. Prepared for New Mexico Environment Department. April.

USEPA. 1989. Risk Assessment Guidance for Superfund, Interim Final. Washington D.C.: Office of Emergency and Remedial Response. OSWER 9285.7-01a. September 1989.

USEPA 1992. Supplemental Guidance to RAGS: Calculating the Concentration Term. Office of Solid Waste and Publication Environmental Protection Emergency Response. OSWER 9285.7-08I. May 1992.

USEPA. 1994. Guidance for the Data Quality Objectives Process. Office of Research and Development. EPA/600/R-96/055. September 1994.

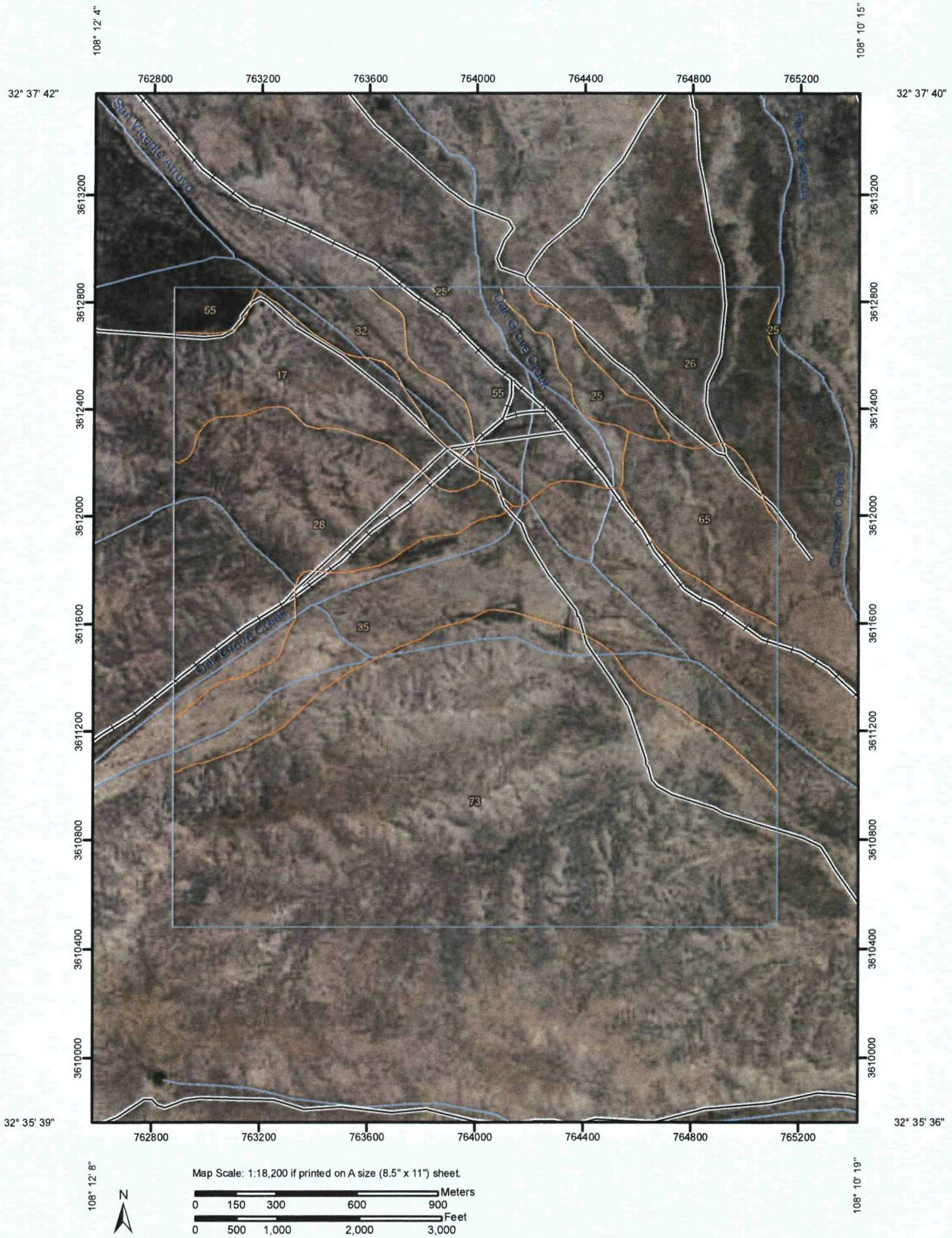
USEPA. 1995. Guidance for Risk Characterization. U.S. Environmental Protection Agency. Science Policy Council. February.

USEPA. 2001. EPA Risk Assessment Guidance for Superfund, Volume III, Part A, Process for Conducting Probabalistic Risk Assessment. EPA 540-R-02-002 OSWER 9285.7-45. December 2001.

USEPA. 2005. Results of EPA's Residential Garden Sampling. Molycorp RI/FS Informational Bulletin. August 2005.

USEPA. 2009. Risk Assessment Guidance for Superfund Volume I: Human Health Evaluation Manual (Part F, Supplemental Guidance for Inhalation Risk Assessment). EPA-540-R-070-002 OSWER 9285.7-82. January 2009.

Soil Map—Grant County, New Mexico, Central and Southern Parts
(STSIU Reference Area)



MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils
- Soil Map Units

Special Point Features
- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other

Special Line Features
- Gully
- Short Steep Slope
- Other

Political Features
- Cities

Water Features
- Streams and Canals

Transportation
- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

MAP INFORMATION

Map Scale: 1:18,200 if printed on A size (8.5" × 11") sheet.

The soil surveys that comprise your AOI were mapped at 1:48,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for accurate map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL: http://websoilsurvey.nrcs.usda.gov
Coordinate System: UTM Zone 12N NAD83

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Grant County, New Mexico, Central and Southern Parts
Survey Area Data: Version 9, Dec 9, 2008

Date(s) aerial images were photographed: Data not available.

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Grant County, New Mexico, Central and Southern Parts (NM662)			
Map Unit Symbol	**Map Unit Name**	**Acres in AOI**	**Percent of AOI**
17	Guy very cobbly loam, 15 to 35 percent slopes	85.3	6.5%
25	Lonti gravelly loam, 15 to 35 percent slopes	24.7	1.9%
26	Lonti gravelly clay loam, 0 to 8 percent slopes	99.3	7.6%
28	Lonti-Manzano association, 1 to 25 percent slopes	173.4	13.2%
32	Manzano loam, 0 to 1 percent slopes	36.9	2.8%
35	Mimbres-Arizo-Riverwash association, 0 to 5 percent slopes	237.1	18.0%
55	Ruidoso clay loam, 3 to 5 percent slopes	104.1	7.9%
65	Stellar-Mohave association, 0 to 5 percent slopes	64.2	4.9%
73	White House-Ruidoso association, 0 to 8 percent slopes	490.0	37.3%
Totals for Area of Interest		**1,315.0**	**100.0%**

Soil Map—Grant County, New Mexico, Central and Southern Parts
(LIU Soil Map)

MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils
- Soil Map Units

Special Point Features
- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other

Special Line Features
- Gully
- Short Steep Slope
- Other

Political Features
- Cities

Water Features
- Streams and Canals

Transportation
- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

MAP INFORMATION

Map Scale: 1:26,800 if printed on A size (8.5" × 11") sheet.

The soil surveys that comprise your AOI were mapped at 1:48,000.

Please rely on the bar scale on each map sheet for accurate map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL: http://websoilsurvey.nrcs.usda.gov
Coordinate System: UTM Zone 12N NAD83

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Grant County, New Mexico, Central and Southern Parts
Survey Area Data: Version 9, Dec 9, 2008

Date(s) aerial images were photographed: Data not available.

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Grant County, New Mexico, Central and Southern Parts (NM662)			
Map Unit Symbol	**Map Unit Name**	**Acres in AOI**	**Percent of AOI**
2	Abrazo-Luzena complex, 15 to 45 percent slopes	28.2	1.7%
12	Encierro-Rock outcrop complex, 8 to 30 percent slopes	48.0	3.0%
37	Muzzler-Rock outcrop association, 25 to 45 percent slopes	949.4	58.8%
46	Pits-Dumps association, extremely steep	196.2	12.1%
54	Rock outcrop-Muzzler association, 25 to 65 percent slopes	168.8	10.5%
56	Ruidoso-Muzzler association, 5 to 15 percent slopes	64.2	4.0%
60	Santa Fe-Rock outcrop complex, 20 to 45 percent slopes	149.7	9.3%
63	Santana-Rock outcrop complex, 1 to 25 percent slopes	10.4	0.6%
Totals for Area of Interest		**1,614.9**	**100.0%**